

REMARKS

Claims 1-14 are all the claims pending in the application.

Drawings stand objected to.

Specification stands objected to because of the informalities.

Claims 1-3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), and further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231).

Claims 4-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), and further in view of Nakano (U.S. Patent Application Publication No. 2002/0033322).

Claims 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), and further in view of Katsumi (JP Patent Document No. 2001-355574).

Claims 11-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), further in view of Nakano (U.S. Patent Application Publication No. 2002/0033322), and further in view of Katsumi (JP Patent Document No. 2001-355574).

Objection to the Drawings

Specification has been amended to alleviate objection to the drawings. It is respectfully requested that the objection to the drawings be withdrawn.

Objections to Specification

Specification has been amended to alleviate objection to the drawings and objections to the specification because of the informalities. It is respectfully submitted that amendments to the specification do not represent any new subject matter. It is requested that the objections to the specification be withdrawn.

Applicants note that the amendment to the specification submitted with the Preliminary Amendment filed August 21, 2006, does not seem to be entered. By the way of this Amendment, Applicants request confirmation of entry of the Amendment to the Specification submitted with the Preliminary Amendment filed August 21, 2006.

Claims 1-3 Distinguish over Cited Prior Art

Claim 1-3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda ("Class D Audio Amplifier Design"), and further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231). Applicants respectfully traverse.

Claim 1 recites, among other elements: "a sine wave oscillation means for generating a sine wave signal."

1. Senda does not describe a sine wave oscillation means

Senda describes a voltage controlled oscillator which outputs rectangular waves. [¶ 0041] Nowhere does Senda teach or suggest using a sine wave oscillator to generate sine waves as recited in claim 1. One of the disadvantages of the non sine wave oscillation is vibrational noise produced by the harmonical component. By using a sine wave oscillation, the present application prevents generation of vibrational noise as described, for example, in ¶ 34.

2. Senda does not describe an amplification means driven by high voltage

Senda describes a D/A converter that converts a digital output signal from a CPU into a voltage output. A VCO 104 outputs a periodic voltage corresponding to the output voltage of the D/A converter that serves as an input to an amplifier. [¶ 0040] As known in the art, an electronic circuit board is not capable of outputting high voltage. Therefore, CPU clearly outputs a low voltage signal which drives the amplifier. Furthermore, Applicants reviewed Senda and did not

find any teaching or suggestion of driving the amplifier with high voltage. As described in the specification of the present application, for example in ¶ 91, the amplifier is driven by high voltage of about 240VDC. Senda clearly does not drive the amplifier with high voltage anywhere close to 240V.

3. Senda does not describe driving the motor with high voltage

Senda describes an amplifier that amplifies the periodic voltage from the frequency divider 105 to a voltage and current capable of driving a vibration motor. [¶ 0041] As known in the art, the vibration motor requires a low voltage, in the range of 1-5V. Therefore, Senda drives the vibration motor with the low voltage, as required by the motor spec. What's more, Applicants reviewed Senda and did not find any teaching or suggestion of driving the vibration motor with high voltage. As described in the specification of the present application, for example in ¶¶ 91 and 105, the piezoelectric element may be driven by high voltage of about 100V. Nowhere does Senda teach or suggest driving the vibration motor with high voltage anywhere close to 100V.

4. Ishii does not describe a voltage-boosting means for converting a low-voltage power supply to a high voltage

Ishii describes a power amplifying apparatus including a step-up converter 100. I.e., the voltage of the battery is stepped up and converted by the step-up converter 100 to supply the output as the power supply voltage V_c . [¶ 0036] In Figs. 4a and 4b, Ishii demonstrates characteristic diagrams obtained by simulating an effect of distortion compensation for the output signal V_o by the variation of the power supply voltage V_c in the power amplifying apparatus. [¶ 0136] The two diagrams show the power supply voltage V_c of about 5V. Therefore, Ishii's power amplifying apparatus accepts as an input a voltage of about 5V. Ishii does not teach or suggest a voltage boosting means for converting a low-voltage power supply to a high voltage. At best, Ishii converts low voltage to low voltage of a different value, as for example, a 1.5VDC battery voltage to 5VDC.

Honda does not cure any deficiencies of Senda and/or Ishii.

Because Senda, Honda, or Ishii, taken singularly or in combination, does not teach or suggest at least "a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump; a voltage-boosting means for

converting a low-voltage power supply to a high voltage; and an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave,” **claim 1** distinguishes patentably and unobviously over Senda, Honda, and Ishii.

Claim 2 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claim 1. Therefore, arguments presented with respect to claim 1 are respectfully submitted to apply with equal force here. Additionally, claim 2 recites, among other elements: “control means for implementing variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means.” **Senda** describes control device which adjusts the frequency of the motor based on the motor temperature. [¶¶ 0052-0054] According to claim 2, the control means adjusts frequency when the sine wave oscillator is activated. E.g., at the power up, when the power is applied to the circuit.

Because Senda, Honda, or Ishii, taken singularly or in combination, does not teach or suggest at least “a sine wave oscillation means for generating a sine wave signal of the frequency that drives a piezoelectric element of a piezoelectric pump; a voltage-boosting means for converting a low-voltage power supply to a high voltage; an amplification means driven by high voltage generated by said voltage-boosting means for amplifying the signal supplied as output from said sine wave oscillation means and for driving said piezoelectric element by a high-voltage sine wave; and control means for implementing variable frequency control over three or more different frequencies at the time of activation of said sine wave oscillation means,” **claim 2** distinguishes patentably and unobviously over Senda, Honda, and Ishii.

Claim 3 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 2. Therefore, arguments presented with respect to claims 1 and 2 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 3** distinguishes patentably and unobviously over Senda, Honda,

and Ishii, taken singularly or in combination.

Claims 4-7 Distinguish over Cited Prior Art

Claims 4-7 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), and further in view of Nakano (U.S. Patent Application Publication No. 2002/0033322). Applicants respectfully traverse.

Claim 4 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claim 1. Therefore, arguments presented with respect to claim 1 are respectfully submitted to apply with equal force here. Additionally, claim 4 recites, among other elements: “a control means for one of increasing or decreasing the signal amplitude of said sine wave oscillation means in accordance with corresponding increased or decreased sensed temperature of said heat-generating body.”

Nakano describes a smooth impact drive mechanism utilizing an electromechanical conversion element. The characteristics of electromechanical conversion elements such as piezoelectric elements change in accordance with the temperature, such that the speed of the moving unit declines as the temperature declines. [¶ 0016] The smooth impact drive mechanism has a temperature sensor that measures the temperature of the electromechanical conversion element. Where the output from the temperature sensor is lower than the prescribed value, the controller increases the amplitude of the drive voltage or the drive frequency, and where the output from the temperature sensor equals or is higher than the prescribed value, the controller reduces the amplitude of the drive voltage or the drive frequency. [¶ 0017] Therefore, Nakano measures the temperature of the piezoelectric element and increases the voltage amplitude when the temperature is low and decreases the voltage amplitude when the temperature is high. To the contrary, claim 4 calls for the voltage amplitude to be increased when the temperature is high and decrease when the temperature is low. Moreover, claim 4 calls for a temperature sensor to measure the temperature of a heat-generating body and not the piezoelectric element itself.

Accordingly, the higher voltage is applied to provide a more efficient cooling means when the heat-generating body radiates more heat.

Because Senda, Honda, Ishii, or Nakano, taken singularly or in combination, does not teach or suggest at least (1) a sine wave oscillation means for generating a sine wave signal; (2) a voltage-boosting means for converting a low-voltage power supply to a high voltage; (3) an amplification means composed of a D-class amplifier driven by high voltage generated by said voltage-boosting means and amplifying the signal supplied as output from said sine wave oscillation means for driving said piezoelectric element by a high-voltage sine wave; (4) a temperature sensing means for sensing temperature of a heat-generating body; and (5) a control means for one of increasing or decreasing the signal amplitude of said sine wave oscillation means in accordance with corresponding increased or decreased sensed temperature of said heat-generating body, **claim 4** distinguishes patentably and unobviously over Senda, Honda, Ishii and Nakano.

Claim 5 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 4. Therefore, arguments presented with respect to claims 1 and 4 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 5** distinguishes patentably and unobviously over Senda, Honda, Ishii and Nakano, taken singularly or in combination.

Claim 6 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1, 2 and 4. Therefore, arguments presented with respect to claims 1, 2 and 4 are respectfully submitted to apply with equal force here. Additionally, claim 6 recites, among other elements: “a first control means for implementing variable frequency control at the time of activation of said sine wave oscillation means; and a second control means for adjusting the signal amplitude of said sine wave oscillation means in accordance with the sensed temperature of said temperature sensing means.” None of Senda, Honda, Ishii or Nakano teaches or suggests a first control means for implementing variable frequency control and a second control means for adjusting the voltage amplitude based on the

sensed temperature.

It is therefore respectfully submitted that **claim 6** distinguishes patentably and unobviously over Senda, Honda, Ishii and Nakano, taken singularly or in combination.

Claim 7 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1, 2, 4 and 6. Therefore, arguments presented with respect to claims 1, 2, 4 and 6 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 7** distinguishes patentably and unobviously over Senda, Honda, Ishii and Nakano, taken singularly or in combination.

Claims 8-10 Distinguish over Cited Prior Art

Claims 8-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), and further in view of Katsumi (JP Patent Document No. 2001-355574). Applicants respectfully traverse.

Claim 8 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claim 1. **Katsumi** does not cure any deficiencies of Senda, Honda and/or Ishii. Therefore, arguments presented with respect to claim 1 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 8** distinguishes patentably and unobviously over Senda, Honda, Ishii and Katsumi, taken singularly or in combination.

Claim 9 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 2. **Katsumi** does not cure any deficiencies of Senda, Honda and/or Ishii. Therefore, arguments presented with respect to claims 1 and 2 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 9**

distinguishes patentably and unobviously over Senda, Honda, Ishii and Katsumi, taken singularly or in combination.

Claim 10 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 2. **Katsumi** does not cure any deficiencies of Senda, Honda and/or Ishii. Therefore, arguments presented with respect to claims 1 and 2 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 10** distinguishes patentably and unobviously over Senda, Honda, Ishii and Katsumi, taken singularly or in combination.

Claims 11-14 Distinguish over Cited Prior Art

Claims 11-14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Senda (U.S. Patent Application Publication No. 2002/0008439) in view of Honda (“Class D Audio Amplifier Design”), further in view of Ishii (U.S. Patent Application Publication No. 2006/0132231), further in view of Nakano (U.S. Patent Application Publication No. 2002/0033322), and further in view of Katsumi (JP Patent Document No. 2001-355574). Applicants respectfully traverse.

Claim 11 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 4. **Katsumi** does not cure any deficiencies of Senda, Honda, Nakano and/or Ishii. Therefore, arguments presented with respect to claims 1 and 4 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 11** distinguishes patentably and unobviously over Senda, Honda, Ishii, Nakano and Katsumi, taken singularly or in combination.

Claim 12 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1 and 4. **Katsumi** does not cure any deficiencies of Senda, Honda, Nakano and/or Ishii. Therefore, arguments presented with respect to claims 1 and 4 are respectfully submitted to apply with equal force here. It is respectfully submitted that

claim 12 distinguishes patentably and unobviously over Senda, Honda, Ishii, Nakano and Katsumi, taken singularly or in combination.

Claim 13 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1, 2, 4 and 6. **Katsumi** does not cure any deficiencies of Senda, Honda, Nakano and/or Ishii. Therefore, arguments presented with respect to claims 1, 2, 4 and 6 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 13** distinguishes patentably and unobviously over Senda, Honda, Ishii, Nakano and Katsumi, taken singularly or in combination.

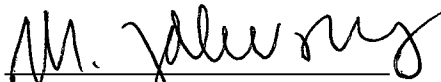
Claim 14 recites features similar to, although not necessarily coextensive with, the features argued above with respect to claims 1, 2, 4 and 6. **Katsumi** does not cure any deficiencies of Senda, Honda, Nakano and/or Ishii. Therefore, arguments presented with respect to claims 1, 2, 4 and 6 are respectfully submitted to apply with equal force here. It is respectfully submitted that **claim 14** distinguishes patentably and unobviously over Senda, Honda, Ishii, Nakano and Katsumi, taken singularly or in combination.

CONCLUSION

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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